

What is claimed is:

1. An analyte pre-concentrator for use with a chromatographic column coupled thereto, comprising:
 - a chromatographic injector;
 - a liner disposed in said injector, said liner having an upper portion and a lower portion;
 - an adsorbent disposed in said liner;
 - wherein the inner wall of the upper portion of said liner partially encloses an upper chamber in which the adsorbent is disposed;
 - wherein the inner wall of the lower portion of said liner partially encloses a lower chamber in which a portion of the chromatographic column is disposed; and
 - wherein the diameter of the lower chamber is smaller than the diameter of the upper chamber.
2. The analyte pre-concentrator as claimed in claim 1, further comprising a heating element disposed in said injector for increasing the temperature of said liner to desorb the analyte into the chromatographic column coupled to said injector.
3. An analyte pre-concentrator as claimed in claim 1, wherein said adsorbent is hydrophobic.
4. An analyte pre-concentrator as claimed in claim 3, wherein said adsorbent is graphitized carbon black.
5. An analyte pre-concentrator as claimed in claim 1, further comprising:

a first fluid pathway in which a sample mixture containing analytes mixes with carrier gas, flows through said adsorbent, which adsorbs the analytes, and is vented from said injector while the chromatographic column coupled to said injector is isolated therefrom; and

a second fluid pathway in which the analytes adsorbed by said adsorbent are desorbed into the column.

6 An analyte pre-concentrator as claimed in claim 1, wherein said injector has a vent in fluid communication with the the lower chamber of said liner, through which vent moisture can be vented from said injector.

7 An analyte pre-concentrator as claimed in claim 6, further comprising a column isolating accessory coupled to said injector, with which accessory chromatographic columns coupled to said accessory are isolated from substances flowing through said injector.

8. An analyte pre-concentrator as claimed in claim 7, wherein;

said injector has a sample mixture inlet by which the sample mixture is introduced into said injector, into said liner, through said adsorbent, and out said vent;

said injector has a main carrier gas inlet in fluid communication with the upper chamber of said liner, by which main carrier gas inlet carrier gas is introduced into said liner;

said column isolating accessory has an auxiliary carrier gas inlet in fluid communication with the lower chamber of said tube, by which auxiliary carrier gas inlet carrier gas is introduced into said injector to isolate chromatographic columns coupled to said accessory; and

the pressures of the main carrier gas inlet and the auxiliary carrier gas inlet are regulatable to introduce carrier gas into the upper chamber of said

liner and isolate the column while the sample mixture is introduced into said injector, while the sample mixture flows through said adsorbent and out said vent, and while carrier gas dry purges said adsorbent and flows out said vent, and are further regulatable to introduce carrier gas into said liner and permit flow into the column while the adsorbed analytes are desorbed into the column.

9. A system for pre-concentrating analytes for use with a chromatographic column coupled thereto, comprising:

a headspace sampler for obtaining headspace vapor containing analytes;

a transfer line connected to said headspace sampler for transferring the headspace vapor;

a housing connected to said transfer line to receive the headspace vapor obtained by said headspace sampler;

a tube disposed in said housing;

an adsorbent disposed in said tube for adsorbing the analytes when the headspace vapor passes through said tube; and

a heating element disposed in said housing for increasing the temperature of said tube to desorb the analyte into the chromatographic column coupled to said housing.

10. The system of claim 9, wherein

said tube has an upper portion and a lower portion;

the inner wall of the upper portion of said tube partially encloses an upper chamber in which said adsorbent is disposed;

the inner wall of the lower portion of said tube partially encloses a lower chamber in which a portion of the chromatographic column is disposed; and

the diameter of the lower chamber is smaller than the diameter of the upper chamber.

11. An analyte pre-concentrator as claimed in claim 9, wherein said adsorbent is hydrophobic.
12. An analyte pre-concentrator as claimed in claim 11, wherein said adsorbent is graphitized carbon black.
13. An analyte pre-concentrator as claimed in claim 9, wherein:

said housing comprises a chromatographic injector; and

said tube comprises a liner disposed in said injector.
14. An analyte pre-concentrator as claimed in claim 9, further comprising:

a first fluid pathway in which the headspace vapor containing the analytes mixes with carrier gas, flows through said adsorbent, which adsorbs the analytes, and is vented from said housing while the chromatographic column coupled to said housing is isolated therefrom; and

a second fluid pathway in which the analytes adsorbed by said adsorbent are desorbed into the column.
15. An analyte pre-concentrator as claimed in claim 9, wherein said housing has a vent in fluid communication with the lower chamber of said tube, through which vent moisture can be vented from said housing.
16. An analyte pre-concentrator as claimed in claim 15, further comprising a column isolating accessory coupled to said housing, with which accessory

chromatographic columns coupled to said accessory are isolated from substances flowing through said housing.

17. An analyte pre-concentrator as claimed in claim 16, wherein;

said housing has a headspace vapor inlet by which the headspace vapor is introduced into said housing, into said tube, through said adsorbent, and out said vent;

said housing has a main carrier gas inlet in fluid communication with the upper chamber of said tube, by which main carrier gas inlet carrier gas is introduced into said tube;

said column isolating accessory has an auxiliary carrier gas inlet in fluid communication with the lower chamber of said tube, by which auxiliary carrier gas inlet carrier gas is introduced into said housing to isolate chromatographic columns coupled to said accessory; and

the pressures of the main carrier gas inlet and the auxiliary carrier gas inlet are regulatable to introduce carrier gas into the upper chamber of said tube and isolate the column while the headspace vapor is introduced into said housing, while the headspace vapor flows through said adsorbent and out said vent, and while carrier gas dry purges said adsorbent and flows out said vent, and are further regulatable to introduce carrier gas into said tube and permit flow into the column while the adsorbed analytes are desorbed into the column.